EQ73 Assembly guide

Safety warning

The kits are main powered and use potentially lethal voltages. Under no circumstance should someone undertake the realisation of a kit unless he has full knowledge about safely handling main powered devices.

Please read the "DIY guide" before beginning.

Print or open the following documents :

- EQ73 Components layout
- EQ73 Schematics
- EQ73 Parts list
- EQ73 Setup guide

Follow this guide from item number 1 till the end, in this order. The assembly order is based on components height, from low to high profile, in order to ease the soldering process : The component you are soldering is always taller than the previously assembled ones and it is pressing nicely against the work area foam.

EQ73 Assembly guide – Main board

1. Input / Output options

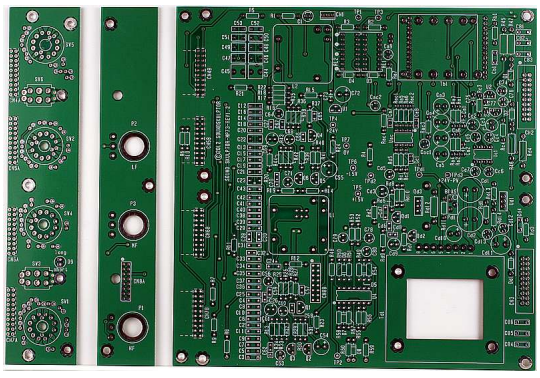
The EQ73 is available in two versions: **Option EB** (Electronically balanced input/output) and **Option TX** (transformer input/output).

- For Option EB, install only **a**, **c** and **ac** suffix components (marked yellow),
- For Option TX, install only **b** and **d** suffix components (marked grey).

The uncoloured components must be installed in both versions.

2. PCB split

Split the PCB along the pre-engraved lines in order to get 3 parts. If necessary you may smooth the cut with a file.



EQ73 Assembly guide – Main board

3. Diodes

Add D1 to D8, Dd1. Use a lead forming tool to bend the leads at 0.4".

Warning : Make sure to respect the direction of the diodes which is marked by a ring on the component and a double line on the PCB marking.

4. Resistors R6 & R10

The resistors R6 and R10 need special care: the solder on the solder side of the PCB must be perfectly flat, in order to allow a good positioning of the connector CN5B, later in the build.

Insert the first resistor in place and, *before soldering*, cut the leads so they do not protrude out of the PCB surface at all. Solder from the *component side* with little solder. Repeat for the other resistor.

5. Resistors

Add R1 to R60, Ra1 to Ra7, Rc1 to Rc4, Rac1 to Rac4 or Rb1, Rd1 to Rd14.
Control the resistor values with a digital multimeter.
Bend the leads at 0.4" with a lead forming tool except for R45, R46, R47, Rd4, Rd12 which are bent at 0.6".

6. IC and relay sockets

Add the 8 pins sockets of Uac1, Uc1.
Add the 14 pins socket of U4.
Add the 16 pins sockets of RL1 and RL2

Warning: Make sure the pin 1 identifying notch on the socket is facing the pin 1 dot on the PCB.

7. Test pins

Solder the test pins TP1 to TP7, TPd1 to TPd3.

8. Ceramic capacitors

Add C57, C65, C73, C75, C77, C81to C86, Ca1, Ca2, Ca7, Ca8, Cc1.

9. Film capacitors

Add C2 to C53, C57 to C59, C62, C65 to C67, C70, Cb1, Cd4, Cd6 to Cd8.

10. Tantalum capacitors

Add C1, C56, C64, Cd5. The plus lead is always on the right when facing the marking with the leads pointing down. It is the longest.

Warning : The +lead must go into the +hole. Do not reverse !

11. Male connector

Solder the 2 x 8 pins header CN8B. Solder one pin first, check verticality, then solder the other pins.

EQ73 Assembly guide – Main board

12. Transistors and regulators

Add Q1 to Q6, U1 to U3, Qd1.

Warning : Watch out the component direction.

13. Connectors

Add CN2 and CN3. Solder one pin first, check verticality, then solder the other pins.

Warning : Check the position of the slot, it must not be mounted backwards.

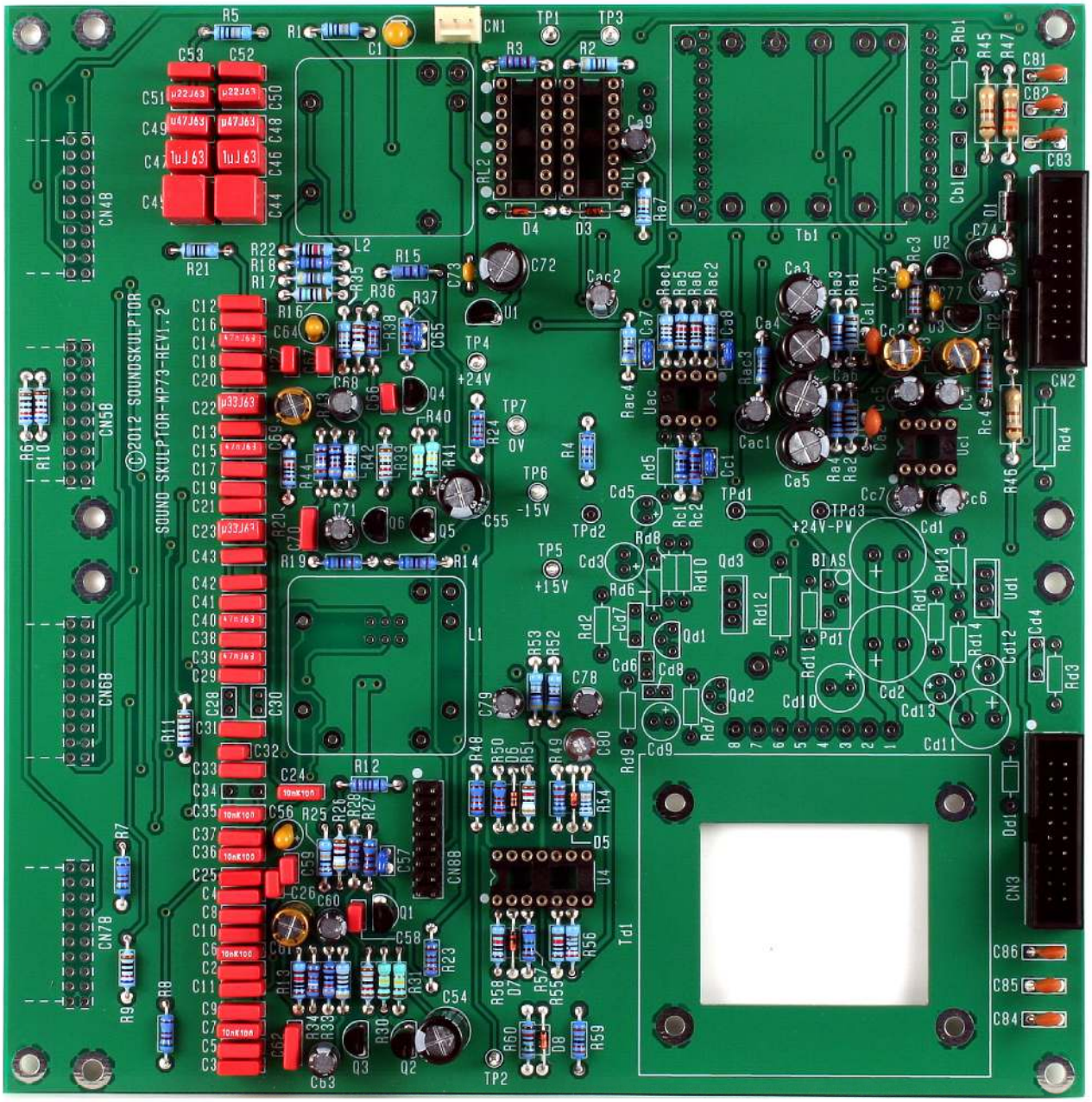
14. Connector

Solder the 3 pins header CN1. Solder one pin first, check position then solder the other pins.

15. Electrolytic capacitors

Add the electrolytic capacitors by size order: diameter 5mm (0.2"), 6.3mm (0.25"), 8mm (0.32"), 10mm (0.4"), 12.5mm (0.5").
Add C80, C60, C63, C68, C71, C74, C76, C78, C79, C61, C69, C72, C54, C55, Ca9, Ca3 to Ca6, Cc4 to Cc7, Cc2, Cc3, Cac1, Cac2, Cd12, Cd13, Cd3, Cd9, Cd10, Cd11, Cd1, Cd2.
Solder one lead first, adjust verticality then solder the second lead.
Warning : The +lead must go into the +hole. Do not reverse (they may explode !)

EQ73 Assembly guide – Main board



*PCB with **Option EB** components (electronically balanced I/O)*

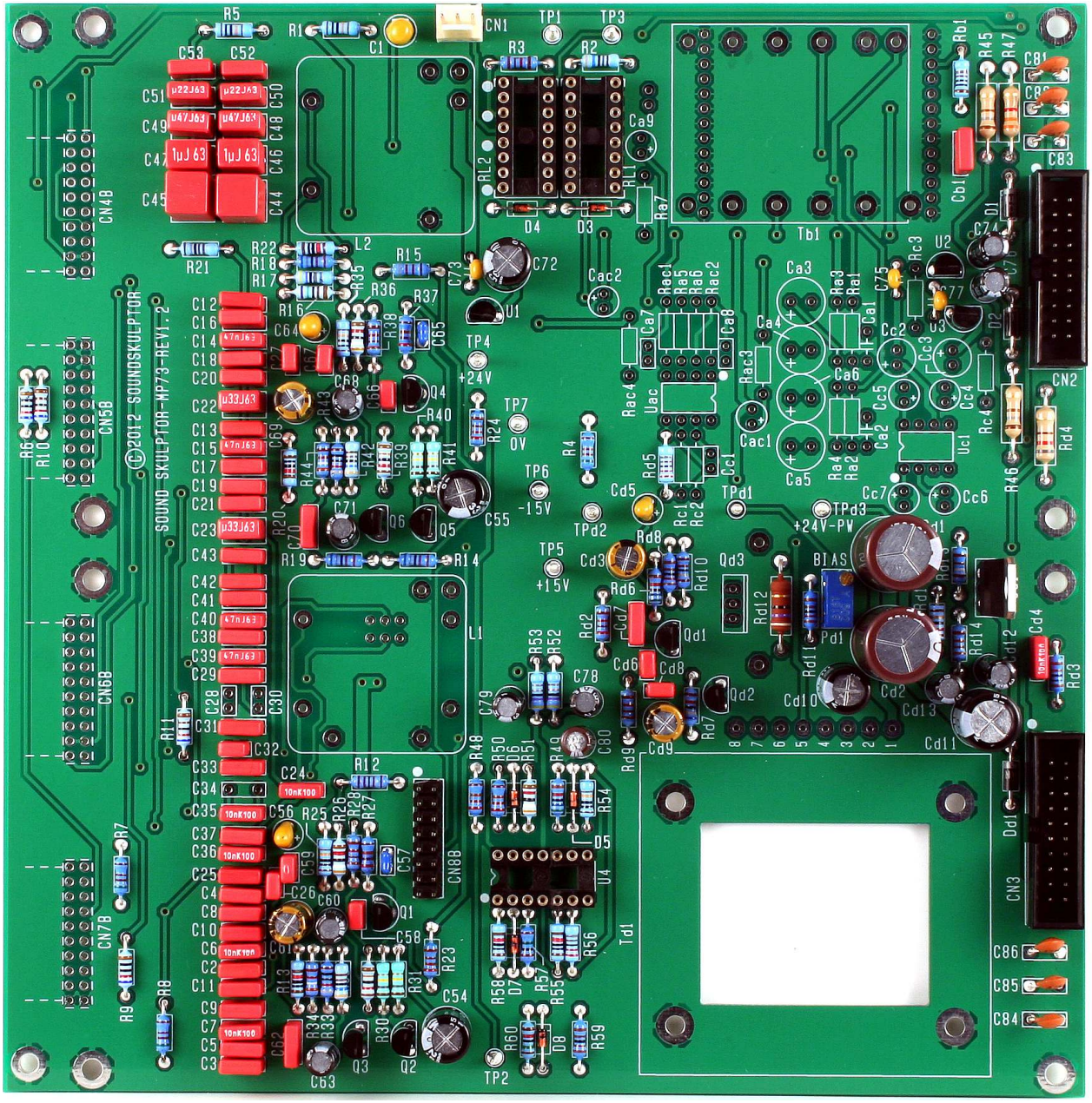
16. Trimmer potentiometer

Add Pd1. Solder one pin, check verticality then solder the other pins.

17. Regulator

Add Ud1. Solder one pin, adjust the position, then solder the two other pins.

EQ73 Assembly guide – Main board

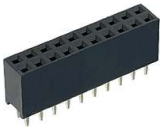


*PCB with **Option TX** components (transformers I/O)*

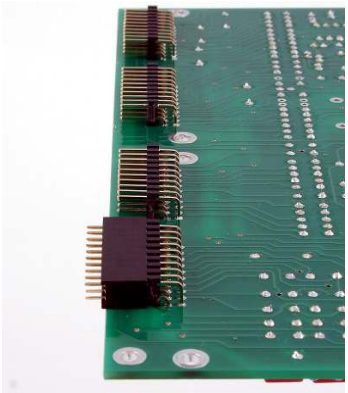
18. CN4B to CN7B connectors

The 2x10 sockets are used to line up the headers perfectly parallel to the PCB.

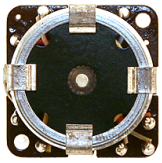
Insert the 2x10 pins 90° headers into the 2x10 pins sockets and place them on the *solder side* of the PCB. Solder on the *components side*.



Remove the four 2x10 sockets from the headers.



EQ73 Assembly guide – Main board



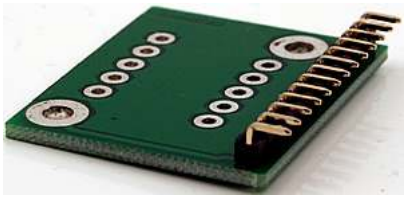
19. Inductors

It is necessary to leave a small gap between the inductors and the PCB surface in order to avoid any electrical contact between the metal parts and pads. Fit a piece of double sided adhesive tape (supplied with the kit) under the inductor, between the pins. It is not necessary to remove the second protective layer from the tape as it is only used as a spacer.

Solder L1 and L2.

20. Input transformer Tb1

Insert the 90° 13 pin headers into the SK5468 PCB. It must be inserted from the solder side (the side without white text), long tail into the hole. Solder one pin, adjust the position then solder the other pins. Cut flush. Do the same for both SK5468's.



Warning : the pin headers must sit perfectly perpendicular to the PCB surface for a good matching with the main PCB.

Remove the 2 screws from the transformer pin side and place 2 nylon washers on the holes.

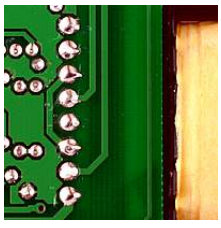
Insert one SK5468 PCB on top of the transformer, white text down, checking the pin number correspondence. Assemble with the 2 screws. Solder the transformer pins.

Place the second SK5468 PCB on the other side of the transformer, white text up. Assemble with the last 2 provided screws.

Insert the transformer into the main PCB and solder the pins.

21. Output transformer

The transformer is mounted using four 30mm M3 screws inserted from the back of the board. The transformer is directly sited on the PCB, without washer. The screws are locked with four self locking nuts.



Shorten the leads to the necessary length, around 6 cm. Strip on 5mm and tin. Insert into the pad hole and solder. Cut flush.
The wire colour/pad number correspondence is shown in the "Layout" document.

22. Power transistor Qd2

Clip Qd2 into its heatsink making sure it is well centred. The transistor must be firmly pinched by the clip. If available a drop of thermal paste can be layered on the back of the transistor.
Insert into the PCB holes and solder one pin of Qd2. Check position then solder the other 2 pins of Qd2 as well as the two heatsink pins.

EQ73 Assembly guide – Main board

23. IC's

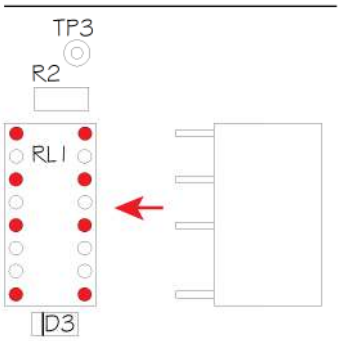
Insert U4, Uac1, Uc1.

Warning : Make sure to respect the IC direction, marked by a notch. It must match the white dot on the PCB.

24. Relays

insert RL1 and RL2 into their socket.
It is useful to lock the relays in place with one single drop of super-glue between body and socket.

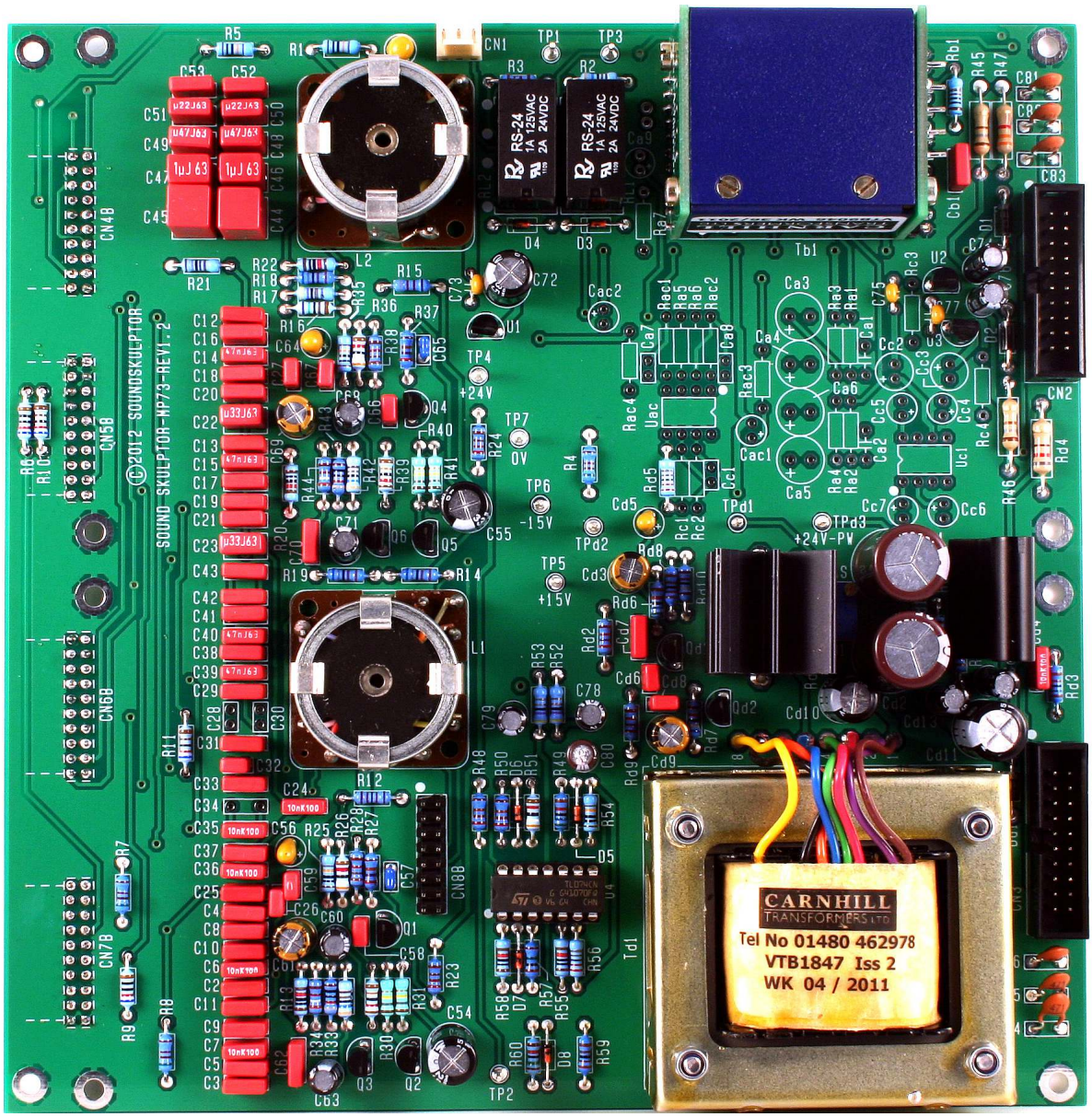
Warning: Make sure to respect the relay direction. The relay pins must match the relay sockets marked by white dots on the PCB (red dots on the next picture).



25. Heatsink

Clip on the heatsink of Ud1.

EQ73 Assembly guide – Main board



*PCB with **Option TX** components (transformers I/O)*

26. Visual check

At this point, brush the solder side with a hard tooth brush to remove any remaining solder bits.

Make a full visual check. Any missing component on the board ? Any remaining component in the box ?

When everything looks correct, proceed with the other boards assembly.

EQ73 Assembly guide – Switches board

27. Anti-clic resistors

Insert and solder 44 4M7 resistors. The resistors are placed vertically.

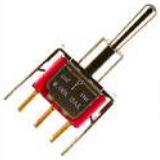
EQ73 Assembly guide – Switches board

28. Rotary switches

Add the 12 positions rotary switch SW4.

Warning : The position of the switches is critical for a good front-plate matching and a smooth potentiometer rotation. The switch rests on 3 small feet that must sit perfectly flat on the PCB. Press the switch on the PCB and solder two opposed pins. Check position then solder the other pins.

Add the other three, 6 positions switches SW1, SW2 and SW5 in the same way.

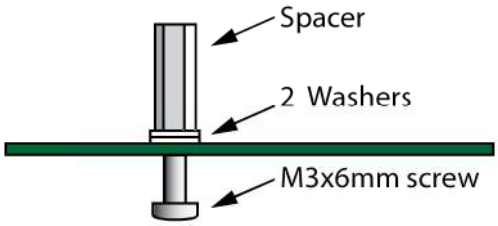


29. Toggle switches

Add the two toggle switches SW3, SW6.
Warning : The position of the switches is critical for a good front-plate matching. They must sit flat on the PCB. Press firmly the switch on the PCB and solder two opposite pins (housing). Check position then solder the other pins.

30. Spacers

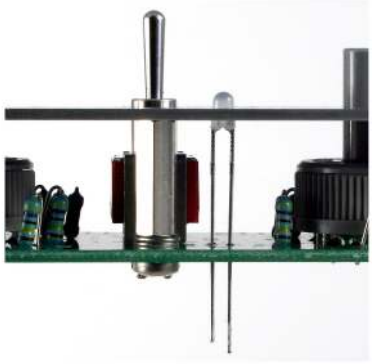
Add two 15mm spacers above the switches with two M3x6mm pan head screws and two metal spacers underneath each spacer.



31. LED

Insert the LED into the PCB holes, taking care of the correct long lead / short lead positioning. Now you can temporarily attach the front panel with two M3x6mm countersunk screws, to provide a guide for the LED soldering. Solder the LED and remove the panel.

The distance from PCB to LED base is 15mm.



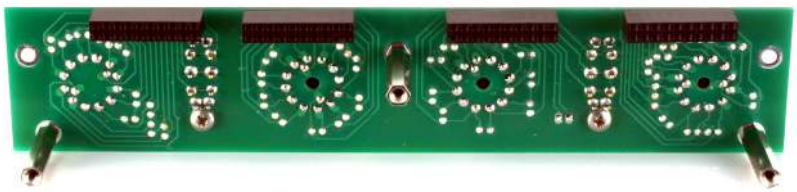
32. 2x10 connectors

Solder the four 2x10 connectors on the *solder side* of the PCB.

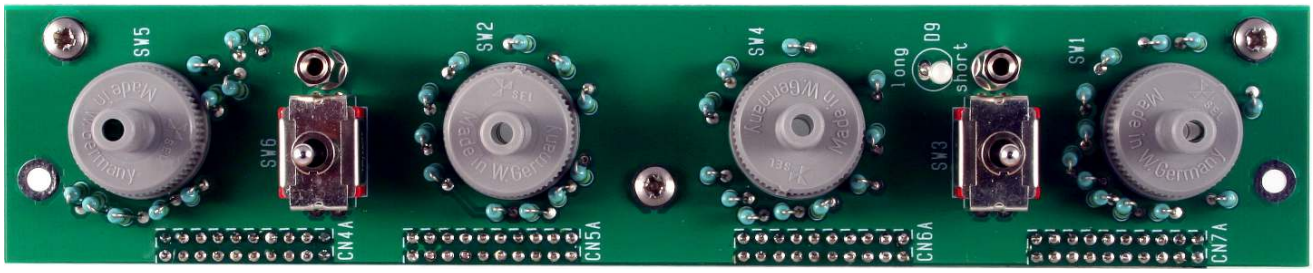
Warning : The position of the connectors is very important to the final assembly. They must sit perfectly flat on the PCB.

33. 25mm spacers

Add three 25mm spacers on the solder side with three M3x6mm pan head screws.



EQ73 Assembly guide – Switches board



EQ73 Assembly guide – Potentiometers board

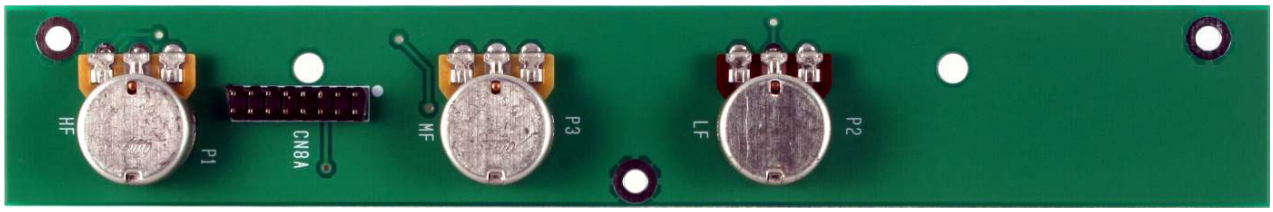
34. Connector

Solder the 2x8 pins header CN8A. Solder one pin first, check position then solder the other pins.

35. Potentiometers

Add P2 (47KA). Insert the potentiometer into the PCB holes from the components side, making sure the pins fit into the corresponding PCB pads. Attach with washer and nut on the solder side, then solder.

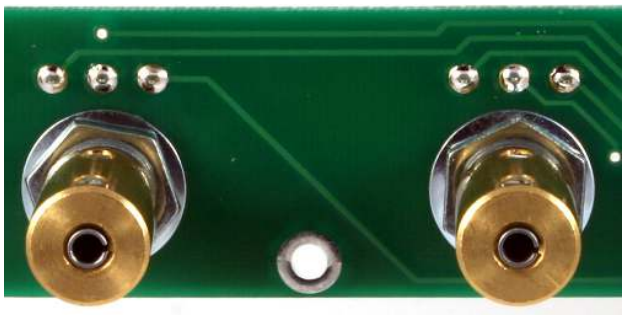
Add P1 and P3 (10KA) in the same way.



36. Potentiometer shaft adapters

Set all three pots at mid track, on the centre detent. Insert the three 6mm/4mm adapters all the way down, with the screws facing towards the pot central pin. Tighten the screws.

Now insert the three 4mm/3mm adapters with their slot perpendicular to the screw. Tighten gently, just enough to hold into position.



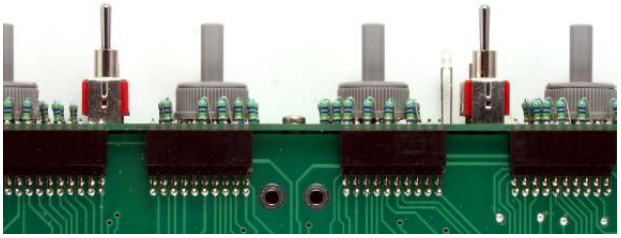
EQ73 Assembly guide – Final assembly

37. Switches board / Controls board assembly

Assemble the 2 boards with three M3x6mm screws into the three 25mm spacers.

38. Main board assembly

Assemble the controls board with the main board by matching the four connectors.



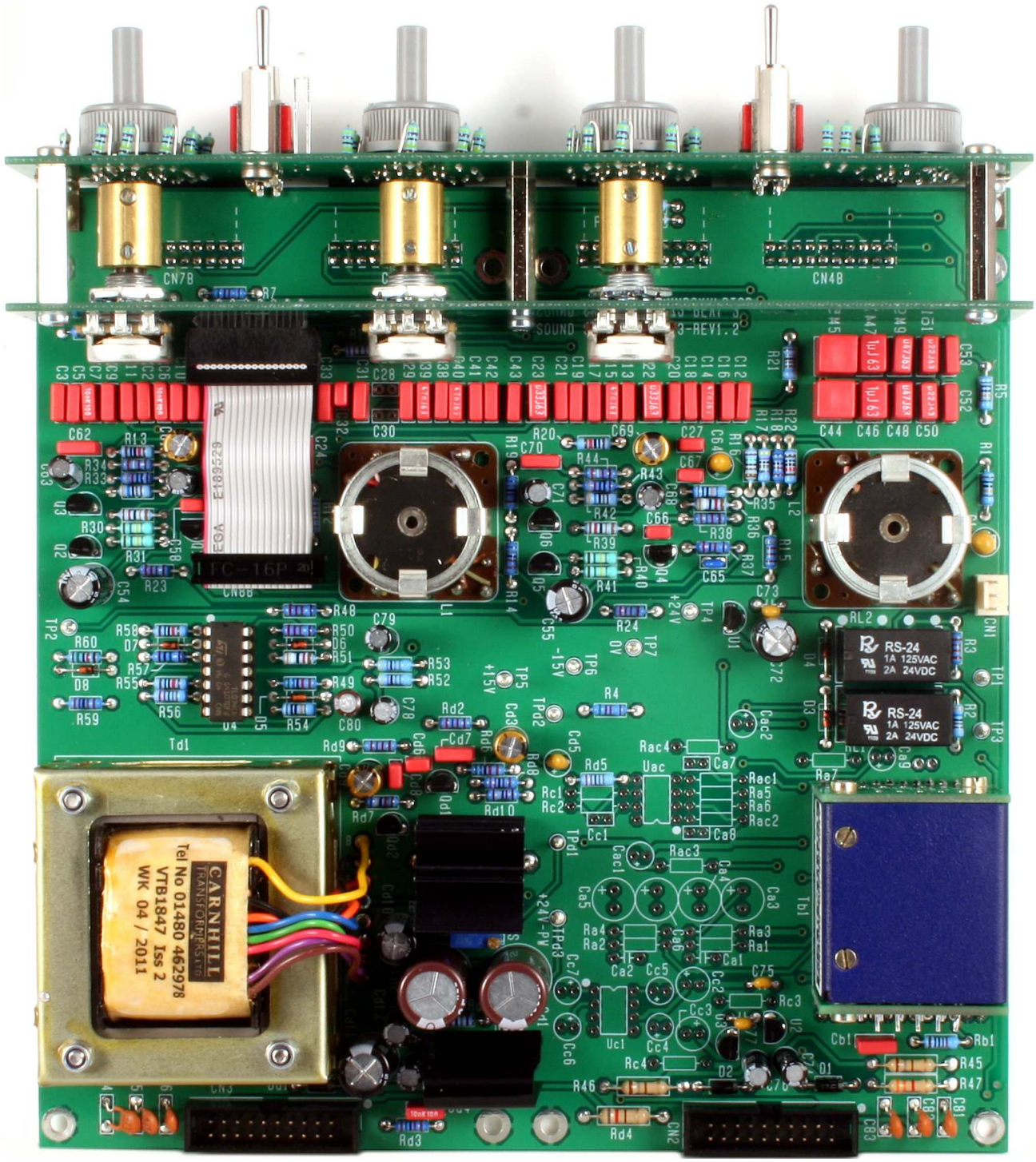
39. Main board assembly

Complete the assembly with two metal brackets, four M3x6mm screws and four self locking nuts.

40. Ribbon cable connection

Connect the small ribbon cable that links the pots board to the main board.

EQ73 Assembly guide – Final assembly



EQ73 Assembly guide – Rack mounting

41. Board installation

Install the board in the case on 8 spacers in a double free slot. Attach with 6 M3x6 screws and six shakeproof washers but do not tighten yet.

EQ73 Assembly guide – Rack mounting

42. Front panel

Attach the EQ73 front panel to the rack front with two M3x8 countersunk black screws, making sure the LED fits into its opening.
Attach the front panel to the two 15mm spacers on the switches board with two more M3x8 screws.
Now tighten the six M3x6 screws on the main PCB.

43. 15mm knobs

Set all the rotary switches fully anti-clockwise.
Attach the three "pass through" knobs to the three rightmost switches, lining up the white lines to the "off" labels.
Attach the screw type button to the left rotary (high pass), lining up the white line to the "off" label and clip on the red cap.

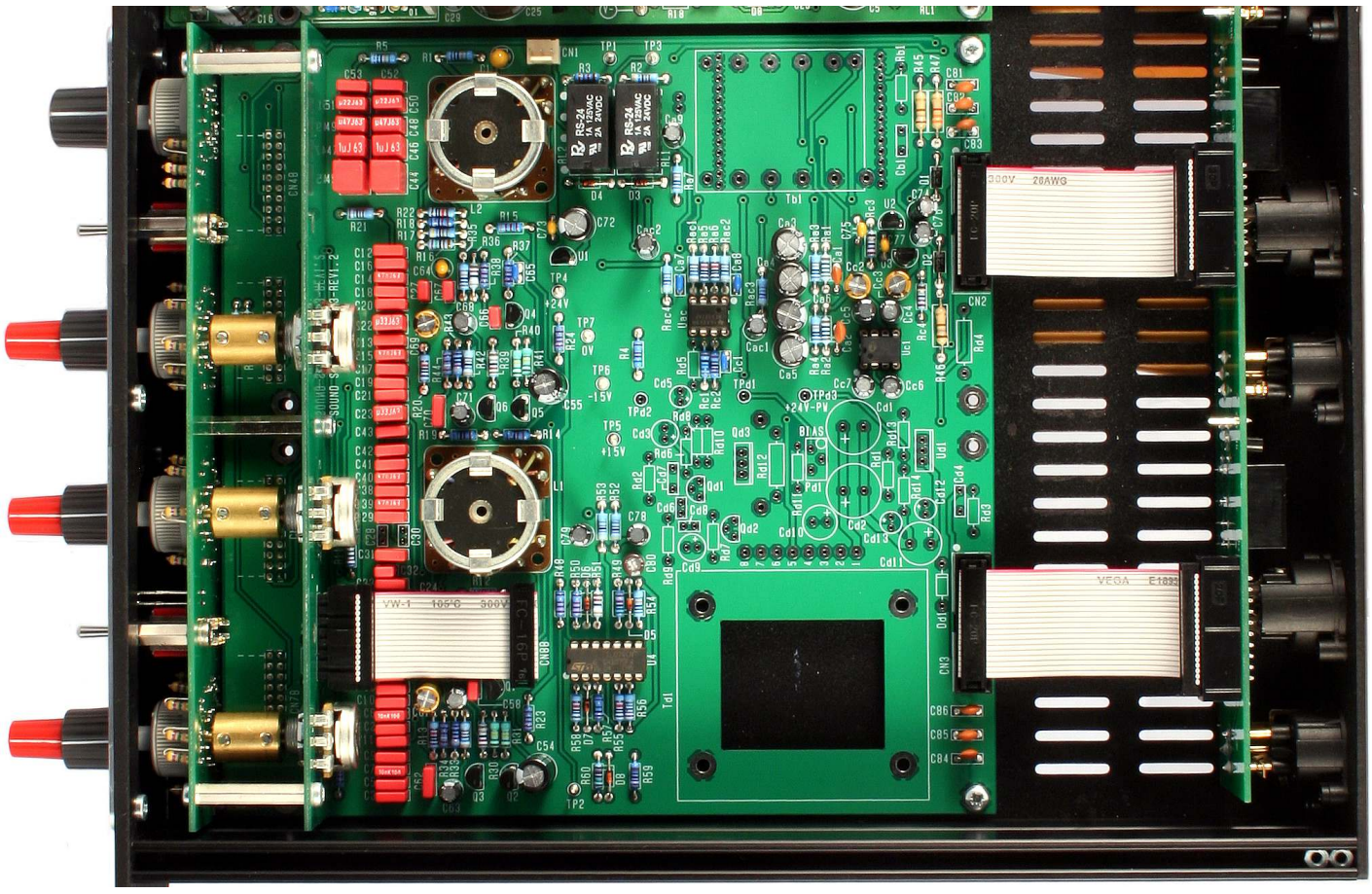
44. 10mm knobs

Set the three potentiometers to their centre click position.
Attach the 3mm shafts to the 10mm knobs and clip on the knob caps.
Insert the shafts into the centre holes while lining up the white line to the top dot on the front panel.
Tighten the screws on the shaft adapters.

If the pots feel a little hard to turn, blow a drop of contact cleaner inside the potentiometers.

45. Ribbon cables

Connect 2 ribbon cables between the board and the SKMP backplane PCB.



EQ73 Assembly guide – Test and setup

46. Short circuit check

Do basic short circuit checks with your digital multimeter (DMM) set to Ohms,

- between 0V (TP7) and +24V (TP4)
- between 0V (TP7) and +15V (TP5)
- between 0V (TP7) and -15V (TP6)
- between Power ground (TPd2) and +24V Power (TPd3)

You should get values greater than one kilo-Ohm. If it is not the case, find out and fix the short before applying power.

47. General power check

Set your DMM to volts on a 30V scale. Connect the black (-) lead to TP7.
Plug in power. Check that the 3 LED's on the PSU are lighting up normally.

Connect the red (+) lead to TPd3. You should read about +24Volts.
Connect the red (+) lead to TP4. You should read about +24Volts.
Connect the red (+) lead to TP5. You should read about +15Volts.
Connect the red (+) lead to TP6. You should read about -15Volts.
Plug off power.

48. Bias adjust (only with Option TX)

With Pd1, we are going to adjust the bias of Qd2 in order to flow about 65mA of direct current in the output transformer primary. To do this, we are going to measure the voltage across resistor Rd12, between TPd1 and TPd2.
Set your DMM to DC volts.
Place the (+) probe of your DMM on the test pin TPd1. Place the (-) probe of your DMM on the test pin TPd2.
Adjust Pd1 until you read 3.0 Volts on the DMM. Pd1 is a multi-turn so it may take several turns to see a change.

Warning : If you do not see any voltage change when turning Pd1, stop adjusting and check your board. You probably have a wiring error.

Warning : Turning Pd1 clockwise increases the current in Qd3. If you turn it too far, the current will reach a value that might smoke Rd12 !

49. Sound check

Plug in a sound source to the input XLR.
Connect the output to your monitoring system. It can be a headphone amplifier or it can go through one of your ADC inputs if you run a software studio.

Check the various EQ controls.
Verify that the green LED lights up when a sound is playing and that it turns red when it come near saturation.

50. Congratulations

You're done!

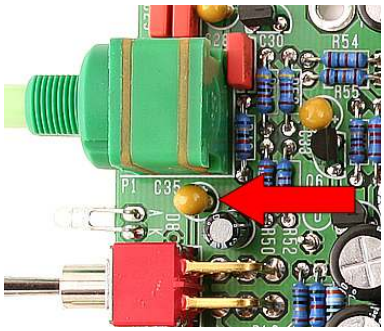
EQ73 Assembly guide – Linking to an MP73

51. Linking to an MP73

The EQ73 can optionally be internally linked to an MP73. This requires connecting a link cable between the MP73 and the EQ. The link cable, supplied in the kit, has a three pins connector for the EQ side, but has to be soldered on the MP73 side.

52. MP73 connection

Remove tantalum capacitor C35, next to the LED, on the MP73 pre board. The capacitor leads are close together and it is possible to heat them both at the same time. Do not hesitate to add a fair amount of solder. Once the cap is removed, empty the holes with a solder pump or solder wick.

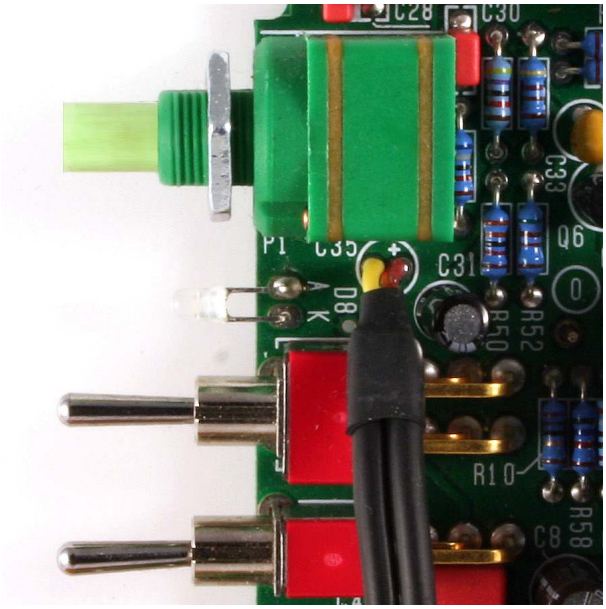


Cut the link cable to the needed length.

Strip of 20mm of black sleeve from both wires of the link cable and cut out all the shielding threads. Insert 15mm of heat shrink sleeve to mask the sleeve cut and heat up.

Strip of 5mm of the red and yellow sleeves and solder the cable in the C35 cap holes, red wire into the (+) hole.

Warning: Do not swap the red and yellow wires.



53. Insertion compensation

Inserting the EQ creates an attenuation of 4.5dB in the pre, limiting the maximum gain to 65.5dB. While this is generally plenty enough, you may want to compensate this loss.

You just need to replace R13 on the MP73, a resistor of 1.5 K-Ohms by a 560 Ohms.

V12V2 adapter board Assembly guide

Safety warning

The kits are main powered and use potentially lethal voltages. Under no circumstance should someone undertake the realisation of a kit unless he has full knowledge about safely handling main powered devices.

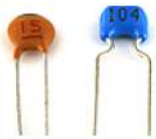
Please read the "DIY guide" before beginning.

Print or open the following documents :

- V12V2 Schematics
- V12V2 Components layout
- V12V2 Parts list

Follow this guide from item number 1 till the end, in this order. The assembly order is based on components height, from low to high profile, in order to ease the soldering process : The component you are soldering is always taller than the previously assembled ones and it is pressing nicely against the work area foam.

V12V2 Adapter board - Assembly guide



1. Ceramic capacitors

Add C2, C4.

2. Regulators

Add U1 and U2.

Warning : Watch out the case direction.

3. Connector

Add CN2. Start soldering one pin, check the position, then solder the other pins.

Warning : Check the position of the slot, it must not be mounted backwards.

4. Electrolytic capacitors

Add C1 and C3.

Warning : The +lead must go into the +hole. Do not reverse (they may explode !)

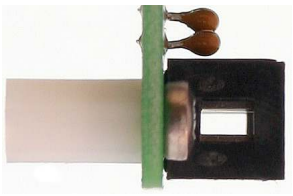
5. Bottom connector

Add C1 on the back side of the PCB.

V12V2 Adapter board - Assembly guide

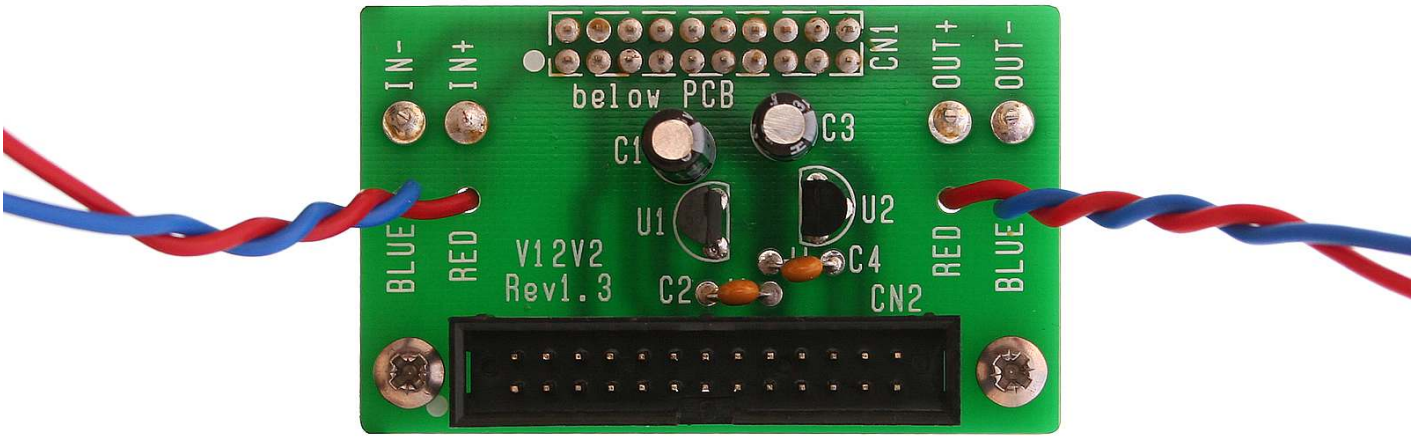
6. Spacers

Attach 2 10mm nylon spacers, below PCB, with 2 M3x6 screws on each side of CN2.



7. Wires

For MP12, MP32, MP73 cut two blue/red pairs of 8cm wires.
For MP66 cut one 8cm pair and one 17cm pair of blue/red wires.
Strip 5mm of one end of each wire.
Solder the red wires at the bottom side of the PCB on the IN+ and OUT+ pads. Long wire on output for the MP66.
Solder the blue wires at the bottom side of the PCB on the IN- and OUT- pads. Long wire on output for the MP66.
Pass the wires through the corresponding holes.
Strip 15mm of the end of each wire and twist the wires by pairs.

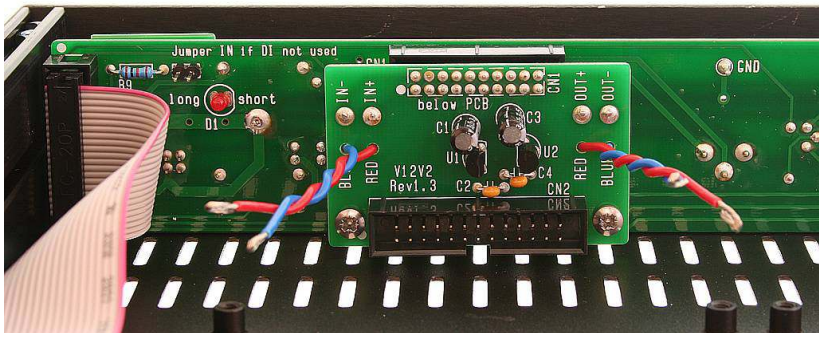


8. Check

After your board has been stuffed, brush the solder side with a hard tooth brush to remove any remaining solder bits.
Make a full visual check. Any missing component on the board ? Any remaining component in the box ?

9. Installation

plug the V12V2 adapter board on the corresponding SKMP connector. One V12V2 board is needed for each mic pre.



10. Connections

Plug in the 26 conductors ribbon cable between the V12V2 adapter and the mic pre board.

Connect the input and output wires between the V12V2 adapter and the mic pre terminals :
Red left to Input+
Blue left to Input -
Red right to Output+
Blue right to Output -

V12V2 Adapter board - Assembly guide